PROGRESS ON THE REGIONAL OBSERVER SCHEME (ROS)

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Purpose

The WPDCS is invited to:

1) **NOTE** the progress made by the Secretariat in modernising the ROS database, developing automated data validation procedures and improving interoperability with national observer data management systems.

2) **NOTE** the main outcomes of the three ROS data workshops conducted in 2026 for purse seine, longline and gillnet fisheries, including the implementation challenges and follow-up activities identified.

3) **CONSIDER** the proposed further developments, including the provision of reference tools and guidance to CPCs, the extension of data quality controls and the development of procedures for automated validation and integration of ROS data.

Abstract

This paper presents progress made by the IOTC Secretariat in 2026 towards strengthening the implementation of the Regional Observer Scheme (ROS). Activities included the modernisation of the ROS database, the development of automated data validation procedures and improvements to interoperability with national observer data management systems. Particular attention was given to the development of reusable tools and common validation standards to support both national data management and reporting to the Secretariat. The paper also summarises the main outcomes of three workshops conducted in 2026 on the implementation of the ROS for purse seine, longline and gillnet fisheries, including challenges associated with alternative data collection methods. Planned developments include automated data integration, expanded data quality controls, self-validation tools for CPCs and further technical guidance to support the implementation of ROS reporting requirements.

Background

Resolution 25/06 establishes the framework for the implementation of the IOTC Regional Observer Scheme (ROS), including requirements for observer coverage, data collection and reporting by CPCs. This paper provides an update on the activities undertaken by the Secretariat in 2026 to support the implementation of these requirements, with particular emphasis on the ROS information system, data validation procedures, interoperability and capacity development. An assessment of the status of ROS data reported to the Secretariat is presented separately in IOTC-2026-WPDCS22-13.

Modernisation of the ROS database

The IOTC Secretariat continued the modernisation of the Regional Observer Scheme (ROS) information system in 2026, with technical support provided through a dedicated consultancy. The work focused on reviewing and consolidating the ROS database structure, developing tools for the validation of observer data submissions, and improving interoperability between national observer data management systems and the IOTC database.

Following the migration of the historical ROS database from Microsoft SQL Server to PostgreSQL, a technical review of the database model was undertaken to simplify its structure, harmonise the representation of observer information across fishing gears, and improve its integration with the IOTC reference data catalogue. The revised model provides a common framework for managing observer data from purse seine, longline, pole-and-line and gillnet fisheries, while retaining gear-specific information and reporting requirements.

The database developments were accompanied by improvements to the documentation of the data model and its relationships with the ROS reporting forms. These activities are intended to facilitate the maintenance and future extension of the ROS information system, including the integration of historical and newly reported observer data.

The database model and associated development scripts are maintained in a dedicated GitHub repository, supporting version control, technical documentation and reproducible database maintenance procedures. The repository also provides tools for generating database metadata and synchronising reference data, facilitating the continued development and long-term sustainability of the ROS information system. Interactive HTML documentation of the database models is also available online, allowing users to explore the database structure and dependencies between tables for each fishing gear (**Fig. 1**).

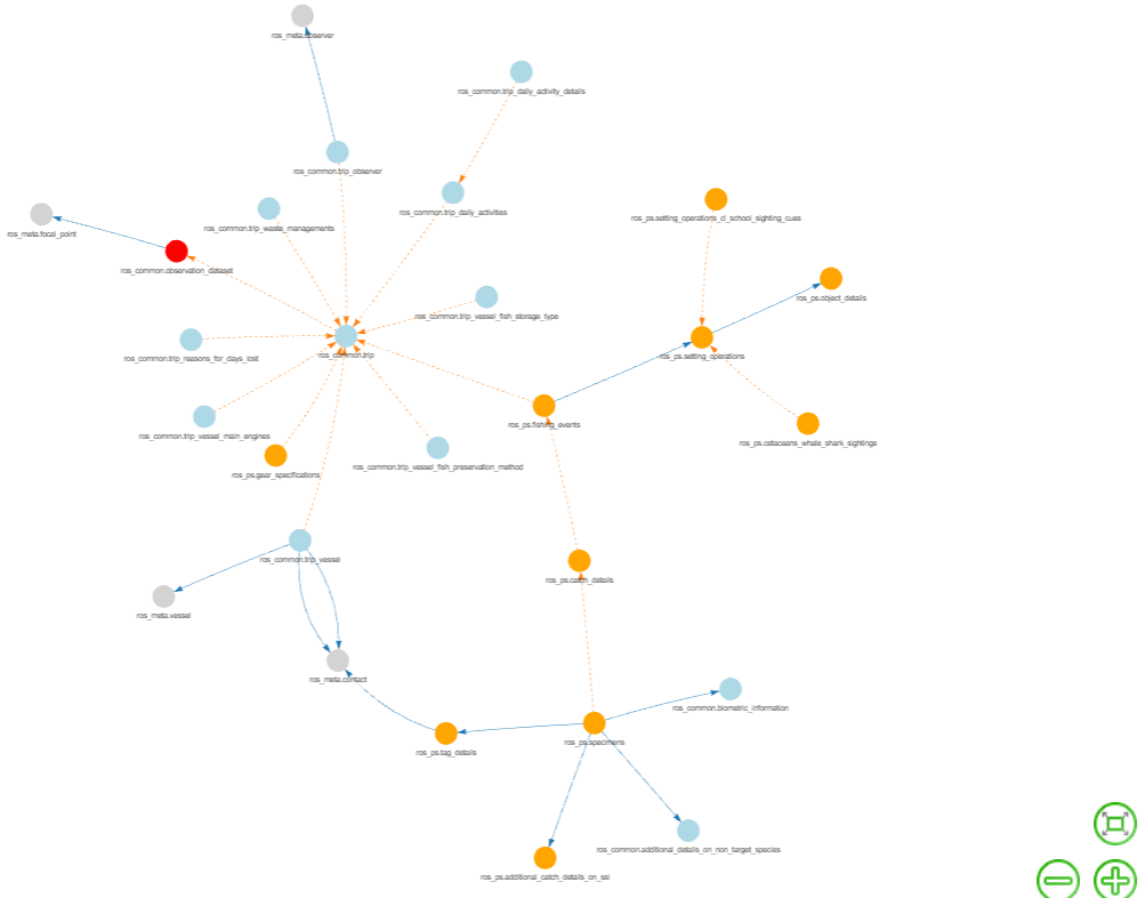

Fig. 1. Overview of the revised ROS database model for purse seine fisheries, illustrating the relationships between database tables. The interactive dependency graph provides further details on the database structure and is also available for other fishing gears. Reference code lists are excluded for readability

Development of the ROS data validation framework

The adoption of mandatory ROS data reporting standards has been instrumental in establishing a common framework for the submission and management of observer data by CPCs. The standardisation of reporting forms, data structures, field definitions and reference code lists provides the foundation for developing automated procedures for data validation, processing and integration into the IOTC ROS database. To support the implementation of these standards, the Secretariat has developed and maintains a range of reporting tools, technical documentation and guidance materials (**Table 1**), which also support the progressive development of automated data processing workflows.

Table 1. Main standards, tools and supporting resources for the implementation of ROS data reporting.

Resource	Description
ROS standards and documentation	ROS minimum data standards, programme requirements, observer manuals and supporting documentation
ROS reporting forms – GitHub	Repository for maintaining and versioning the ROS reporting forms, including their development history and associated documentation

Resource	Description
ROS form descriptions	Detailed descriptions of the ROS reporting forms, including field definitions, reporting requirements, data formats and reference code lists
ROS reporting guidelines	Technical guidance for preparing and submitting ROS data in accordance with the reporting standards
IOTC Shiny applications	Catalogue of interactive applications developed by the Secretariat, intended to host the future ROS data self-validation application

An important component of the work undertaken in 2026 concerned the development of a reusable framework for validating ROS data submitted by CPCs. The framework builds on dedicated R packages, including form.model, which provides versioned definitions of reporting forms, their structure, fields and associated constraints. These definitions support the development of standardised validation procedures for assessing the conformity of submissions with the ROS reporting requirements, including mandatory fields, reference code lists and consistency rules (**Fig. 2**).

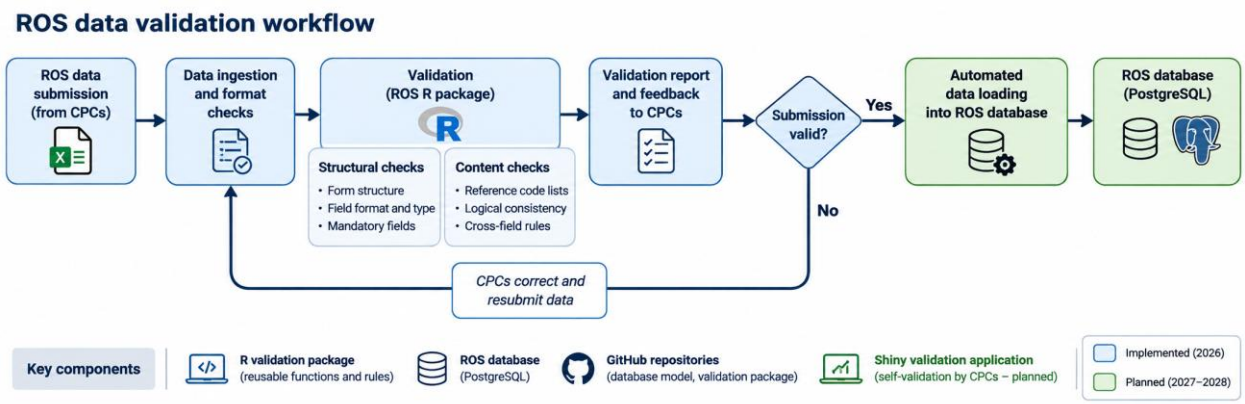

Fig. 2. Overview of the ROS data validation workflow, illustrating the structural and content checks applied to CPC submissions, the provision of validation feedback and the correction and resubmission process. The workflow also includes the planned automated integration of validated data into the ROS database and the development of a Shiny application for CPC self-validation

Initial testing was undertaken using ROS submissions prepared with version 3 of the reporting forms. The exercise covered 171 files, comprising 152 longline and 19 purse seine submissions, and identified a range of structural and data-related issues requiring further investigation. These included differences between historical reporting templates and the specifications used by the validation tools. The results therefore highlighted both the need to improve the consistency of data submissions and the importance of ensuring that validation rules remain compatible with the relevant versions of the reporting forms.

Preparatory work was also undertaken to extend the validation framework to version 4 of the ROS reporting forms, incorporating the revised data reporting requirements. Further developments will focus on expanding the validation procedures to include thematic plausibility checks, such as species-specific size ranges and expected daily catch rates. These checks would be implemented through configurable validation rules, allowing their application to be adapted to different fishing gears, species and fisheries.

The definition of appropriate indicators and reference ranges is expected to be undertaken in collaboration with CPC experts through the Sustainable Western Indian Ocean Programme (SWIOP; see IOTC-2026-WPDCS22-07). The resulting indicators, recommended ranges and associated validation rules would be documented and made available online, together with a guide to best practices for implementing data validation procedures at the national level.

The development of common validation procedures is expected to improve the consistency, transparency and reproducibility of the Secretariat's data processing workflows, facilitate the provision of structured feedback to CPCs, and ultimately support the automated integration of validated submissions into the ROS database. A dedicated Shiny application is also planned to allow CPCs to undertake preliminary validation of their submissions before transmission to the Secretariat.

Interoperability and further developments

The collection and management of observer data under the ROS remain the responsibility of CPCs, which are required to report data to the Secretariat in accordance with the applicable ROS standards. Meeting these requirements can be challenging given the large number of data fields, the diversity of fishing operations and the need for dedicated tools and technical expertise to support data collection, quality control, processing and reporting. These challenges are particularly relevant for CPCs developing new longline or surface fisheries, or implementing chartering arrangements that may introduce additional data collection and reporting requirements not initially anticipated by their national programmes.

In this context, the Secretariat aims to support CPCs by identifying and documenting a set of reference tools and recommended practices for fisheries data collection and management, extending beyond the specific requirements of the ROS. The objective is not to prescribe particular software solutions, but to facilitate access to existing tools, promote interoperability, and provide technical guidance to CPCs developing or upgrading their national information systems. Particular attention will be given to the use of common reference data, standardised data structures and reusable validation procedures. Beyond facilitating compliance with IOTC reporting requirements, this approach is intended to strengthen data quality assurance and management at the national level, while reducing duplication of development efforts and promoting the exchange of data between systems.

As an initial case study, the Secretariat is supporting developments involving *ObServe*, an open-source application used by several CPCs, including the European Union, Seychelles and Mauritius, for the management of observer data since 2010 (Cauquil et al. 2015). The application supports data collection and management for purse seine and longline fisheries, and its development resources and documentation are available through the ObServe project website.

Work is under way to develop a dedicated R package, ros.form.observe, to facilitate the extraction and conversion of observer data stored in *ObServe* into the standardised IOTC ROS reporting forms (**Fig. 3**). The package is designed to select and extract relevant observations, map them to the corresponding fields of the ROS forms, harmonise reference codes and generate Excel workbooks for subsequent validation. Initial development focuses on longline fisheries, with the underlying architecture intended to support purse seine fisheries through gear-specific mappings.

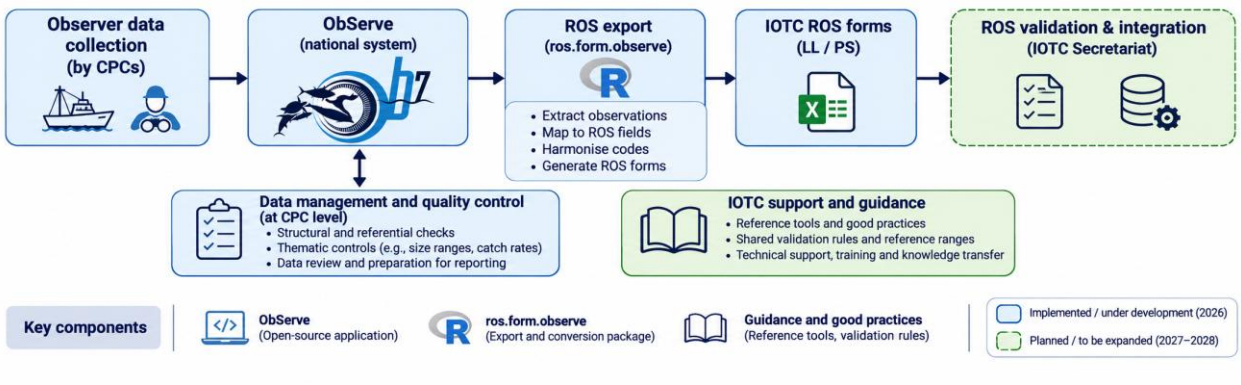

Fig. 3. Overview of the interoperability between national observer data management systems and the IOTC ROS reporting framework, using ObServe as an example. The workflow illustrates the conversion of observer data into standardised ROS reporting forms and the proposed extension of validation procedures and technical guidance to strengthen data quality management at the national level

The development has also highlighted differences between the information recorded in *ObServe* and the fields defined in the ROS reporting forms. Some optional ROS fields are not currently collected in *ObServe* and therefore cannot be populated automatically. These differences are not expected to prevent the generation of ROS-compliant submissions, provided that mandatory information is available and the exported forms satisfy the applicable validation requirements. This exercise also provides an opportunity to identify potential improvements to the underlying data collection tools and their alignment with the ROS standards.

Building on this experience, the Secretariat intends to promote the development of reusable data validation procedures that could be implemented directly within national information systems, including *ObServe*. In addition to structural and referential checks, these procedures would progressively incorporate thematic plausibility controls, such as species-specific size ranges, catch rates and other indicators relevant to the different fisheries. The definition of these indicators and their recommended reference ranges would be undertaken in consultation with CPC experts, with the aim of establishing a shared set of validation rules and associated guidance that could be applied consistently across national systems.

Further developments planned under the consultancy include completion and testing of the *ObServe* export procedures, automated validation and loading of ROS submissions into the IOTC database, and the development of a Shiny application to allow CPCs to validate their data before submission. These activities will be accompanied by technical documentation, training and knowledge transfer to support the long-term maintenance and use of the system.

Outcomes of the ROS data workshops conducted in 2026

Three workshops addressing the implementation of the IOTC Regional Observer Scheme were organised in 2026, covering purse seine, longline and gillnet fisheries. The workshops provided opportunities to review national observer programmes, discuss the implementation of the revised ROS reporting forms and identify technical and operational challenges associated with the requirements of Resolution 25/06.

For purse seine and longline fisheries, the workshops focused on the implementation of version 4 of the ROS reporting forms, the harmonisation of data reporting procedures, and the identification of gaps in historical data submissions. The Secretariat presented the evolution of the reporting forms, the supporting documentation and reference data catalogue, as well as preliminary results from the validation of data previously submitted using version 3 of the forms.

Participants also presented their national observer programmes, including the use of human observers and electronic monitoring systems (EMS), and discussed opportunities to improve the completeness and consistency of data reported to the Secretariat.

The purse seine workshop highlighted the need to improve the completeness of historical ROS submissions, review sampling schemes and strengthen interoperability with national observer data management systems, particularly ObServe. The longline workshop identified differences in the calculation and reporting of observer coverage, particularly where fishing effort is reported only at trip level rather than by individual fishing operation. Participants also discussed the need to harmonise EMS data reporting protocols and associated reference standards.

The workshop on gillnet fisheries addressed the particular difficulties associated with the implementation of conventional on-board observer programmes in artisanal and semi-industrial fleets, including constraints related to vessel size, available space and safety conditions. These difficulties have been recognised in previous ROS discussions and continue to represent an important gap in observer coverage.

Resolution 25/06 provides for the consideration of alternative on-board data collection methods, subject to the relevant implementation plans and endorsement requirements. The workshop therefore focused on reviewing existing national approaches, including crew-based data collection, port-based monitoring and other

complementary methods, and assessing their potential contribution towards meeting the minimum ROS data requirements.

Participants shared experiences from I.R. Iran, Indonesia, Pakistan and Sri Lanka. These highlighted the diversity of existing approaches and the need for a common framework to assess their coverage, reliability and consistency with ROS data standards.

Several priorities emerged from the discussions, including the need to establish a common definition of a gillnet fishing operation for the calculation of observer coverage, provide guidance on the preparation and assessment of implementation plans for alternative data collection methods, and test the revised ROS-GN reporting form using data from existing national programmes. Additional needs were identified concerning statistical raising procedures and species identification.

The main outcomes and follow-up actions identified during the three workshops are summarised in **Table 2**.

Table 2. Summary of the scope, participation and main outcomes of the three IOTC ROS workshops conducted in 2026.

Workshop	Scope and participation	Main outcomes and follow-up
Purse seine (16–19 March 2026, Seychelles)	6 CPCs and invited experts. ROS form v4, observer data, FAD and buoy information, and ObServe	Complete and re-export historical ROS data; review sampling schemes; consider complementary EMS coverage; improve ObServe interoperability and reference data synchronisation
Longline (26–29 May 2026, South Africa)	12 participants from 8 CPCs and invited experts. ROS form v4, reporting gaps, observer coverage calculations and EMS	Harmonise effort reporting for observer coverage calculations; address limitations of trip-level reporting; review EMS reporting protocols and data standards; consider further technical work on EMS data validation
Gillnet (4–5 November 2026, online)	More than 20 participants from 4 CPCs and invited experts. Alternative data collection methods under Resolution 25/06	Develop a common definition of a gillnet fishing operation; develop guidance for alternative-method implementation plans; pilot ROS-GN reporting using national programme data; improve statistical raising and species identification guidance

Review of ROS observer manuals

An initial technical review of the ROS observer manuals was undertaken to identify redundancies in data recording procedures and assess their consistency with the revised reporting forms and associated data standards.

Recognising that observer training remains the responsibility of CPCs, the Secretariat intends to seek feedback on the use of the existing manuals and undertake a more comprehensive review. This will focus on sampling protocols, estimation methods and practical guidance for data collection, taking into account the operational characteristics of the different fisheries and the activities undertaken by observers.

References

Cauquil, P., Rabearisoa, N., Sabarros, P.S., Chavance, P., and Bach, P. 2015. ObServe: Database and operational software for longline and purse seine fishery data. *In* IOTC Proceedings. IOTC, Olhao, Portugal, 7-11 September 2015. p. 20. Available from https://iotc.org/documents/observe-database-and-operational-software-longline-and-purse-seine-fishery-data-0.